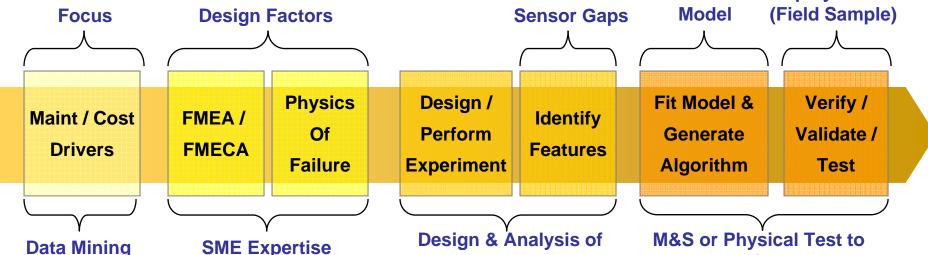


Prognostic & Diagnostic Process Map



Deploy & Test



Analysis:

- ILAP / OSMIS
- AMSAA SDC
- PEO / PM Data

2009/2010 Targets:

- Powertrain
- Track
- Electrical System

Analysis:

- Identify failure modes
- Derive design factors and sensor strategy

FMEAs Developed:

- Diesel Engine
- Transmission
- Alternators

Analysis:

· Identify data features / fault signature

Experiments

Data fusion techniques

Analytical Tools:

- DOE Tools
- Data Analysis Tools

Improve Sensitivity

Algorithm Improvement:

Enhance

- Model fit to only significant factors and interactions
- Additional tests to improve sensitivity

Testing:

- Team with AMSAA for field testing
- M&S and additional physical testing to introduce more noise factors

Increasing knowledge and capability through proper experimental design and analysis!



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Seeded Fault Testing & Algorithm Development











Schedule	FY09	FY10	FY11
CAT C7 Engine			
Allison 2500 Transmission			
Prestolite 130A Alternator			
Li-ion and PbA Batteries			

Purpose:

- Development of health assessment models and algorithms for common automotive components through seeded fault and durability analysis at the component level
- Identification of sensor strategies that could be implemented in a ground vehicle application to allow for accurate diagnosis of impending faults
- Evaluation of the potential Return on Investment (ROI) for implementing these technologies in a vehicle
- Collaboration with AMSAA to evaluate the developed algorithms in a vehicle environment

Products:

- Prognostic and Diagnostic algorithms for selected failure modes
- Sensor strategy for vehicle implementation
- · ROI Analysis

Payoffs:

- Provide critical insight into sensors required for diagnosis of component health and prediction of Remaining Useful Life (RUL)
- Allow for replacement of the component prior to a failure that could potentially damage or dead-line a vehicle
- Provide Government owned knowledge that can be applied across a variety of vehicle platforms





Condition Based Maintenance Areas of Interest



Diagnostics / Prognostics:

- Tools and techniques for development
 - Software Tools (Glyphworks, LabVIEW, Matlab)
 - Prognostic techniques (Usage Models, Signature Analysis)
 - Development Methodologies (DOEs, Seeded Fault, Durability Test)



- Use of broadcast CAN and external sensor data only
- Limited access to proprietary parameters
- No access to internal ECU variables
- FMEAs for common automotive components
 - Powertrain (Heavy Duty Diesel Engines and Transmissions)
 - Electrical (Batteries, Alternators, Starters)
- Data Formats
 - Open standard, compressible

Vehicle Health Aggregation

- Use of health data to inform intelligent system management
- Effective user display and alert schemes (colors, fonts, etc)











Embedded Smart Displays





